

# Employee Churn Risk Agent - Code Explanation

This document explains each step of the Python project where an AI agent predicts employee churn, interprets the risk, recommends HR actions, and sends email notifications.

## 1. Import Libraries

Libraries like pandas, sklearn, matplotlib are used for ML, and smtplib is used to send emails.

## 2. Load & Prepare Dataset

Read your CSV file using pandas. Separate the target variable 'churn' from the features.

## 3. Train-Test Split

Split the dataset using train\_test\_split (80% train, 20% test).

## 4. Train Random Forest Model

Fit a RandomForestClassifier to predict employee churn.

## 5. Visualize Decision Tree

Use sklearn's plot\_tree to show a decision path. Helps HR understand model decisions.

## 6. Predict Churn Probability

Predict churn probabilities for test set using predict\_proba.

## 7. Interpret Risk Level

Use thresholds ( $\geq 0.8$  = High,  $\geq 0.5$  = Medium, else Low) to assign risk labels.

## 8. Recommend Actions

Based on risk, suggest HR actions like assigning a mentor or 1:1 check-ins.

## 9. Setup Email API (Gmail SMTP)

Login using Gmail App Password. Send formatted emails with subject/body to HR.

## 10. Notify HR

Loop through high/medium risk employees and email their ID, risk level, probability, and recommended action.

## Summary Table

Stage	Description
Predict	RandomForestClassifier to predict churn

Interpret	Convert probabilities into risk labels	
Recommend	Recommend HR actions	
Notify	Send email alert to HR	